Term Information

Effective Term	Spring 2021
Previous Value	*Autumn 2020*

Course Change Information

What change is being proposed? (If more than one, what changes are being proposed?)

We are proposing that GEOG 5201 be offered in alternative formats. In addition to the traditional in person lecture, we propose to teach GEOG 5201 as a hybrid course (predominately online with one 50 minute in class session per week) and as a completely online course.

What is the rationale for the proposed change(s)?

The new format will make the course more available to students in all terms who need the course offered in an alternative format to accommodate work or athletic schedules, greater accessibility needs, as well as to accommodate students who are away from the OSU campus. The COVID-19 pandemic has also made it necessary for our courses to have online offerings. Alternative formats will also provide greater capacity potential enrollments without detracting from student learning and instructor engagement.

What are the programmatic implications of the proposed change(s)?

(e.g. program requirements to be added or removed, changes to be made in available resources, effect on other programs that use the course)?

None

Is approval of the requrest contingent upon the approval of other course or curricular program request? No

Is this a request to withdraw the course? No

General Information

Course Bulletin Listing/Subject Area	Geography
Fiscal Unit/Academic Org	Geography - D0733
College/Academic Group	Arts and Sciences
Level/Career	Graduate, Undergraduate
Course Number/Catalog	5201
Course Title	GeoVisualization
Transcript Abbreviation	GeoVisualization
Course Description	Examination of issues, techniques and applications of analytic cartography, interactive maps and scientific visualization for exploring geographic data.
Semester Credit Hours/Units	Fixed: 3

Offering Information

Length Of Course	14 Week, 12 Week
Flexibly Scheduled Course	Never
Does any section of this course have a distance education component?	Yes
Is any section of the course offered	100% at a distance Greater or equal to 50% at a distance
Previous Value	*No*
Grading Basis	Letter Grade
Repeatable	No
Course Components	Laboratory, Lecture, Recitation
Grade Roster Component	Laboratory

Credit Available by Exam	No
Admission Condition Course	No
Off Campus	Never
Campus of Offering	Columbus

Prerequisites and Exclusions

Prerequisites/Corequisites	Prereq: A grade of C- or above in 5200 or 5200S.
Exclusions	
Electronically Enforced	Yes

Cross-Listings

Cross-Listings

Subject/CIP Code

Subject/CIP Code	27.0301
Subsidy Level	Doctoral Course
Intended Rank	Junior, Senior, Masters, Doctoral

Requirement/Elective Designation

Required for this unit's degrees, majors, and/or minors
The course is an elective (for this or other units) or is a service course for other units

Course Details

Course goals or learning objectives/outcomes

- Understanding the issues and techniques surrounding computer based mapping and visualization; hands-on experience with transforming and preparing spatial data for exploration, visualization, and interactive mapping

Content Topic List

- GeoVisualization
- Map data structures and transformations
- Analytical techniques and visual representations
- Map animation
- Web mapping
- Virtual environments
- Scientific visualization

Sought Concurrence No

Attachments

- GEOG5201-online-geovisualization.docx: Syllabus (online)

  (Syllabus. Owner: Xiao,Ningchuan)
- GEOG5201-hybrid-geovisualization.docx: Syllabus (hybrid)

  (Syllabus. Owner: Xiao,Ningchuan)
- GEOG5201-asctech-review.docx: ASCTech review (online)

  (Other Supporting Documentation. Owner: Xiao,Ningchuan)
- GEOG5201-hybrid-asctech-review.docx: ASCTech review (hybrid)

  (Other Supporting Documentation. Owner: Xiao,Ningchuan)
- GEOG5201-inperson-geovisualization.docx: Syllabus (in person)

  (Syllabus. Owner: Xiao,Ningchuan)
- Syllabus_Geog5201_online_v1.docx: Syllabus (online, updated)

  (Syllabus. Owner: Xiao,Ningchuan)
- Syllabus_Geog5201_hybrid_v1.docx: Syllabus (hybrid, updated)

  (Syllabus. Owner: Xiao,Ningchuan)
- GEOG5201-online-geovisualization_v2.docx: Syllabus (online, updated v2)

  (Syllabus. Owner: Xiao,Ningchuan)
- GEOG5201-hybrid-geovisualization_v2.docx: Syllabus (hybrid, updated v2)

  (Syllabus. Owner: Xiao,Ningchuan)

Comments

- The comments from the panel are addressed in the latest updated syllabi (those marked as v2 in the description in the updated files):

  1. Readings are now included at the end of both syllabi and are referenced in the schedule.

  2. The hybrid syllabus describes the in-person and online components on the first page in the second paragraph of the Course Description section.

  3. The syllabi have included the required elements outlined in the syllabus template.

  4. The wording and error in the grading section are now corrected. *(by Xiao,Ningchuan on 11/14/2020 02:47 PM)*
- Please see 10-28-20 email to N. Xiao and N. Ettlinger *(by Oldroyd,Shelby Quinn on 10/28/2020 10:18 AM)*

Workflow Information

Status	User(s)	Date/Time	Step
Submitted	Xiao,Ningchuan	07/20/2020 01:46 AM	Submitted for Approval
Approved	Munroe,Darla Karin	07/24/2020 05:34 PM	Unit Approval
Approved	Haddad,Deborah Moore	07/25/2020 09:02 AM	College Approval
Revision Requested	Oldroyd,Shelby Quinn	09/24/2020 05:14 PM	ASCCAO Approval
Submitted	Xiao,Ningchuan	10/05/2020 09:14 PM	Submitted for Approval
Approved	Ettlinger,Nancy	10/05/2020 10:03 PM	Unit Approval
Approved	Haddad,Deborah Moore	10/06/2020 08:37 AM	College Approval
Revision Requested	Oldroyd,Shelby Quinn	10/28/2020 10:18 AM	ASCCAO Approval
Submitted	Xiao,Ningchuan	11/14/2020 02:47 PM	Submitted for Approval
Approved	Munroe,Darla Karin	11/18/2020 01:17 PM	Unit Approval
Approved	Haddad,Deborah Moore	11/18/2020 03:40 PM	College Approval
Pending Approval	Jenkins,Mary Ellen Bigler Hanlin,Deborah Kay Oldroyd,Shelby Quinn Vankeerbergen,Bernadette Chantal	11/18/2020 03:40 PM	ASCCAO Approval

GEOG 5201 Geovisualization (Online)
Syllabus

Instructor Information

- Dr. Yang Song, song.630@osu.edu
- Office Hours and Location: Zoom meetings by appointment only.

Teaching Associates

- TA:
  Office Hours and Location:
- Grader:

Course Description

This is a topic-oriented course focusing on the examination of concepts, techniques, issues and applications of analytical cartography, interactive mapping, and scientific visualization of geographic data. Approximately half of the course will be lectures introducing concepts and theories of geovisualization. The rest of the course will provide hands-on experience on interactive mapping and visualization of geographic data with ArcGIS and other software.

This course is 100% online, and there is no required log-in to Carmen at a scheduled time. The course is divided into weekly modules which are released weekly. All course materials (slides, lecture videos, lab data and exam study guide etc.) will be provided online via Carmen. Each online lecture (may include multiple videos) will take approximately 80 minutes to finish while time to finish a lab may be longer than a regular lab session (80 minutes). Students are expected to watch lecture videos weekly and keep up with weekly deadlines for lab assignments, exams, and short essays. This is a 3-credit hour class. For each week, students should expect approximately 3 hours spent on online lectures and labs, and 6 hours of independent study such as textbook reading, online quizzes, lab assignments and preparation for the exam to earn a C grade.

Course Learning Outcomes

By the end of the semester, students should be able to:

- Describe following concepts: analytical cartography, spatialization, interactive visualization, scientific visualization and geovisualization. Identify goals, driving forces, cognitive aspects, and widely employed methods and techniques of geovisualization.
- Understand the motivation of the development of 3D geovisualization. Identify the gains of going from 2D to 3D. Think critically about 3D geovisualization, identify potential problems employing 3D visualization techniques.

- Memorize the full name of LiDAR and describe the purpose of this remote sensing technique. Describe the physical process, operational theory, components, and principles of LiDAR systems. Understand basic processing steps of LiDAR data.
- Understand the concept of uncertainty and its importance in visualizing geographic data. Describe and compare methods of mapping uncertainty with visual variables.
- Know how time geography was born and understand the concept of space-time. Describe the constrains of space-time and how to use space-time prism to address space-time. Explain why time geography has barely developed since born and how GIS helps the visualization of time.
- Describe the brief evolution of cartography, from general purpose maps to cartography to web and interactive mapping. Identify the context of the emerging of web mapping. Describe the gold of web mapping and explain the difference between traditional and web mapping. Compare and contrast visual elements employed in traditional and web mapping. Identify programming languages and data formats utilized in web mapping.

Materials

- Textbook and reading materials:
    - No textbook is required for this course. All reading materials (each one with a pdf file) will be provided via Carmen.
    - Each week's reading materials, including lecture and essay readings, are organized in a module in Carmen. All content in each module is required for reading.
- Data storage:
    - A portable memory device (with 16GB or larger storage) or a cloud drive (Box, Dropbox etc.) is needed for data storage.

Evaluation

- Labs – 50%
    - There will be 12 labs, each with an assignment. All lab assignments will count toward your final grade of the course.
    - Lab assignments are usually due ***one week after a lab is assigned (6:00pm of the due day)***. Some of them will be granted longer time to finish due to complexity. Please refer to the course schedule for detailed information.
    - All lab assignments will be submitted via the course website in a quiz-like format. For each assignment, you need to answer several questions and may be asked to upload your work and/or data. Assignment questions will be provided to you in advance at the end of each lab's instruction.
- Exams – 30%
    - There will be two non-cumulative exams. Both will be administered using the course website. More details (question format, exam time and length etc.) will be provided at least one week before each exam via Carmen.

    - Exams cannot be opened in Carmen once finished. If you want to review exams, please schedule a meeting with the instructor.
- Short Essays – 20%
    - There will be 4 short essay assignments focusing on the themes of 3D, LiDAR, Time, and Web. After reading papers related to each theme, you will need to submit an essay of the geovisualization method covered by the readings of the theme via the course website. Please refer to course schedule for more information on when to read papers of different themes and dues of essays.
- Grading Scale

A	93-100%	B-	80-82%	D+	67-69%
A-	90-92%	C+	77-79%	D	60-66%
B+	87-89%	C	73-76%	E	0-59%
B	83-86%	C-	70-72%		

    - Your final grade as seen on the course website will be rounded to the nearest whole number (e.g. an 89.49 is a B+ while an 89.50 is an A-) before being submitted to the University Registrar at the end of the semester.

Course Policies

- Email correspondence policy
    - You are responsible for all course related emails, so be sure to check your inbox on a daily basis.
    - When emailing your instructor, TA or grader, please always begin the subject of the email with the course number (GEOG5201) and your name (first name followed by last name). This is important as your instructor and TA teach multiple classes and need to know to which class you are referring. A proper email subject should be like this:

      GEOG5201_John Smith_Questions on Lab 3
- Course website policy
    - You are responsible for all announcements, additional readings, assignments and other material posted on the course website. Be sure to check it frequently.
    - You may find that it helps to update your notifications. You can do this by going to Account > Notifications. There are four notification options, and I suggest that you turn on “Notify me right away” or at least “Send daily summary” for everything until you figure out which notifications are most beneficial to you.
- Lab questions policy
    - If you have any questions on lab content (can’t finish specific steps, tools are not working etc.), please contact your TA via email.
    - If you have concerns on lab grades, please contact your grader via email.
- Late submission policy
    - Short essays will not be accepted late.
    - Lab assignments will be penalized 10% for each day late.

    - Extensions will not be granted due to lost work; be sure you back up and keep all your work.
- Exam policy
    - Exams must be taken at the scheduled time (detailed information can be found in Carmen), unless you have informed your instructor ***before*** the exam with proper reasons and documents, and got approved by the instructor. Please contact your instructor in advance of the scheduled exam to schedule a make-up exam, except in the case of emergency.
- Disability services policy
    - Students with disabilities that have been certified by the Office for Disability Services (SLDS) will be appropriately accommodated and should inform the instructor as soon as possible of their needs.
        - Address: 098 Baker Hall, 113 W. 12th Ave, Columbus, OH 43210
        - Telephone: 614-292-3307
        - Website: http://slds.osu.edu/
    - Registration with SLDS does not grant accommodations automatically. You need to bring the accommodation form provided by SLDS to the instructor to work out a plan for accommodations. Please contact the instructor as soon as you are registered with SLDS for attendance, assignment and/or exam accommodations.
- Academic Misconduct policy
    - It is the responsibility of the Committee on Academic Misconduct (COAM) to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term “academic misconduct” includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee (Faculty Rule 3335-5-487). For additional information, see the Code of Student Conduct: http://studentlife.osu.edu/pdfs/csc_12-31-07.pdf.
    - Collaboration for the purposes of troubleshooting is highly encouraged in this course, but everyone is expected to submit their own unique work. For example, asking a classmate how to resolve an unexpected error message is OK, but using another classmate’s work (e.g. screen captures, etc.) as your own is NOT ok, regardless of whether or not they provide consent for the use of their materials. (Note: There are many other acceptable/unacceptable actions than those exemplified here.) If you have any questions or concerns about acceptable/unacceptable actions, ask your instructor for clarification/permission.
    - All open-ended responses to questions, prompts, etc. must be written entirely, nearly entirely, or at least in majority using your own words. Use credible sources, and cite all sources, including those only referenced, those indirectly paraphrased, and those directly quoted, being sure to use quotation marks to identify excerpts from these credible sources. This expectation to cite all of your sources also extends to the textbook, the lab instructions, lecture slides, other course materials, online resources, etc.

Please contact Center for the Study and Teaching of Writing (CSTW, https://cstw.osu.edu/writing-center) or the instructor if you have difficulties organizing language for assignments.

- Other Course Policy
  - Please refer to Student Academic Services for more academic services provided by OSU.
  - Other student services can be accessed here.

Other Course Technology

Please contact OSU IT Service Desk for any help with password, university e-mail, Carmen, or any other technology issues, questions, or requests. Standard support hours are available at https://ocio.osu.edu/help/hours, and support for urgent issues is available 24x7.

- Phone: 614-688-HELP (4357)
- Email: 8help@osu.edu
- Self-Service and Chat support: http://ocio.osu.edu/selfservice

Basic technical skills necessary for this course

- Basic computer and web-browsing skills
- Navigating and utilizing Carmen

Equipment

- Computer: As ArcGIS Desktop/Pro software will be used, a Windows PC is needed. Specific system requirements can be found here.
- Webcam: built-in or external webcam, fully installed.
- Microphone: built-in laptop or tablet mic or external microphone.

Software

- ArcGIS. You may request a 1-year student trial license from your TA. Just email your TA, and your TA will send you an activation code. You will then need to activate the code and download the software here: http://www.esri.com/software/landing_pages/arcgis/desktop-ed.
  - If you choose to go this route, there is a detailed document regarding the entire process of downloading and installing ArcGIS for Desktop and authorizing it using an authorization code available on the course website, entitled ESRI_installation_tips.pdf. If your installation-related questions are not answered by this document, you will need to contact ESRI Customer Support at 1 (888) 377-4575.
  - Please note that ArcGIS for Desktop is NOT certified or supported on the Mac operating system. However, if you have an Apple computer running Windows, you can install ArcGIS for Desktop using VMWare, BootCamp, or Parallels. To learn more, please visit this link: http://gis.harvard.edu/services/blog/installing-arcgis-desktop-mac.
  - System requirements of ArcGIS desktop can be found here. Privacy policies of Esri products can be found here.

- ArcGIS Online and ArcGIS Pro. Please refer to associated installation documents in Carmen for detail. There is no specific system requirement for ArcGIS Online and you can use it as long as you have a web browser. System requirements of ArcGIS Pro can be found here. Privacy policies of Esri products can be found here.
- QGIS. This is free and open source and can be obtained by visiting https://www.qgis.org/en/site/. Unlike ArcGIS, QGIS can operate on the Mac operating system.
    - Please note that if you choose to install QGIS onto your personal machine, your instructor and TA are NOT responsible for answering your installation-related questions. You will need to troubleshoot such issues yourself.
    - There is no official documents regarding system requirements of QGIS, but you can find useful discussion on this topic here. There are no official privacy policies from developers of QGIS.
- Microsoft Office 365
    - All Ohio State students are now eligible for free Microsoft Office 365 ProPlus through Microsoft's Student Advantage program. Each student can install Office on five PCs or Macs, five tablets (Windows, iPad® and Android™) and five phones.
    - Office 365 is installed within student's BuckeyeMail account. Full instructions for downloading and installation can be found here.
    - Proctorio: A software to monitor online exams. More details can be found here.
- Proctorio: A software to monitor online exams. More details can be found here.

Schedule

Week	Content	Readings	Note
1	Course Overview Discussion Groups (sign up)	Lecture readings: Geovisualization	
2	Lecture: Geovisualization - Part 1		
	Lecture: Geovisualization - Part 2	Lecture readings: 3D	
3	Lecture: Geovisualization - Part 3 3D - Part 1	Essay readings: 3D	
4	Lecture: 3D - Part 2		
	Lab 1: 3D ArcScene (guided)		Essay on 3D Due
5	Lab 2: 3D ArcScene (unguided)		
	Lab 3: 3D QGIS (guided & unguided)		Lab 1 Due
6	Lecture: LiDAR - Part 1	Essay readings: LiDAR	Lab 2 Due
	Lecture: LiDAR - Part 2		Lab 3 Due
7	Exam 1		Essay on LiDAR Due
	Lab 4: LiDAR (guided)	Lecture readings: Uncertainty	
8	Lecture: Uncertainty	Lecture readings: Animation	
	Lecture: Animation Lab 5: Animation (guided & unguided)	Lecture readings: Time	Lab 4 Due
9	Lecture: Time	Essay readings: Time	
	Lab 6: Time (guided)		Lab 5 Due
10	Lab 7: Time (unguided)	Lecture readings: Web	Essay on Time Due
	Lecture: Web – Part 1	Essay readings: Web	Lab 6 Due
11	Lecture: Web – Part 2		Lab 7 Due
	Exam 2		Essay on Web Due
12	Lab 8: Web 1 (guided & unguided)		
13	Lab 9: Web 2 (guided & unguided)		Lab 8 Due
	Lab 10 (guided & unguided)		
14	Lab 11 (guided)		Lab 9 Due
	Lab 12 (guided & unguided)		Lab 10 Due
15	Work on labs, no class		Lab 11 Due
			Lab 12 Due

This course schedule provides a general plan for the course. Any changes will be announced by the instructor with as much advance notice as possible.

Lecture Reading List

Geovisualization

1. Tobler, W. R. (1976). Analytical cartography. *The American Cartographer*, *3*(1), 21-31.
2. Franklin, W. R. (2000). Applications of analytical cartography. *Cartography and Geographic Information Science*, *27*(3), 225-238.
3. Friendly, M., & Denis, D. J. (2001). Milestones in the history of thematic cartography, statistical graphics, and data visualization. *URL http://www. datavis. ca/milestones*, *32*, 13.

3D

1. Shepherd, I. D. (2008). Travails in the third dimension: A critical evaluation of three-dimensional geographical visualization.

Uncertainty

1. MacEachren, A. M., Robinson, A., Hopper, S., Gardner, S., Murray, R., Gahegan, M., & Hetzler, E. (2005). Visualizing geospatial information uncertainty: What we know and what we need to know. *Cartography and Geographic Information Science*, *32*(3), 139-160.
2. Deitrick, S., & Edsall, R. (2008). Making uncertainty usable: Approaches for visualizing uncertainty information. *Geographic Visualization: Concepts, Tools and Applications*, 277-291.

Animation

1. Muehlenhaus, I. (2013). *Web cartography: map design for interactive and mobile devices*. CRC Press, 173-190.

Time

1. Hägerstraand, T. (1970). What about people in regional science?. *Papers in regional science*, *24*(1), 7-24.
2. Kwan, M. P. (2004). GIS methods in time-geographic research: Geocomputation and geovisualization of human activity patterns. *Geografiska Annaler: Series B, Human Geography*, *86*(4), 267-280.
3. Goodchild, M. F. (2013). Prospects for a space–time GIS: Space–time integration in geography and GIScience. *Annals of the Association of American Geographers*, *103*(5), 1072-1077.

Web

1. Muehlenhaus, I. (2013). *Web cartography: map design for interactive and mobile devices*. CRC Press, 1-59.
2. Muehlenhaus, I. (2013). *Web cartography: map design for interactive and mobile devices*. CRC Press, 197-230.

Essay Reading List

3D

1. Richards-Rissetto, H., Robertsson, J., von Schwerin, J., Agugiaro, G., Remondino, F., & Girardi, G. (2014). Geospatial Virtual Heritage: a gesture-based 3D GIS to engage the public with Ancient Maya Archaeology. *Archaeology in the Digital Era*, 118-130.
2. Kwan, M. P., & Kotsev, A. (2015). Gender differences in commute time and accessibility in S ofia, B ulgaria: a study using 3 D geovisualisation. *The Geographical Journal*, *181*(1), 83-96.
3. Kete, P. (2016). Physical 3D Map of the Planica Nordic Center, Slovenia: Cartographic Principles and Techniques Used with 3D Printing. *Cartographica: The International Journal for Geographic Information and Geovisualization*, *51*(1), 1-11.

LiDAR

1. Hoffmeister, D., Zellmann, S., Pastoors, A., Kehl, M., Cantalejo, P., Ramos, J., ... & Bareth, G. (2016). The investigation of the Ardales Cave, Spain–3D documentation, topographic analyses, and lighting simulations based on terrestrial laser scanning. *Archaeological Prospection*, *23*(2), 75-86.
2. Lee, H. S., Kim, I. H., & Kim, H. G. (2016). Application of Terrestrial 3D Laser Scanning to Monitor Changes of Beach Landforms. *Journal of Coastal Research*, (75), 173-177.
3. Yan, W. Y., Morsy, S., Shaker, A., & Tulloch, M. (2016). Automatic extraction of highway light poles and towers from mobile LiDAR data. *Optics & Laser Technology*, *77*, 162-168.

Time

1. Chen, X., & Clark, J. (2013). Interactive three-dimensional geovisualization of space–time access to food. *Applied Geography*, *43*, 81-86.
2. Lu, Y., & Fang, T. B. (2015). Examining personal air pollution exposure, intake, and health danger zone using time geography and 3D geovisualization. *ISPRS International Journal of Geo-Information*, *4*(1), 32-46.
3. Cheng, E., Meiss, K., Park, K., Gillis, J., Weber, D., Ahmad, S., & Calyam, P. (2016, October). Contextual geotracking service of incident markers in disaster search-and-rescue operations. In *2016 IEEE 15th International Symposium on Network Computing and Applications (NCA)* (pp. 22-26). IEEE.
4. Turdukulov, U., & Fazio, T. (2016, April). Exploring Kimberley Bushfires in Space and Time. In *CEUR Workshop Proceedings* (Vol. 1570, pp. 25-29).

Web

1. Resch, B., Wohlfahrt, R., & Wosniok, C. (2014). Web-based 4D visualization of marine geo-data using WebGL. *Cartography and Geographic Information Science*, *41*(3), 235-247.
2. Kim, H. W., Kim, D. S., Lee, Y. W., & Ahn, J. S. (2015). 3-D Geovisualization of satellite images on smart devices by the integration of spatial DBMS, RESTful API and WebGL. *Geocarto International*, *30*(4), 422-440.
3. Herman, L., Stachoň, Z., Stuchlík, R., Hladík, J., & Kubíček, P. (2016). TOUCH INTERACTION WITH 3D GEOGRAPHICAL VISUALIZATION ON WEB: SELECTED TECHNOLOGICAL AND USER ISSUES. *International Archives of the Photogrammetry, Remote Sensing & Spatial Information Sciences*, *42*.

4. Khoshabi, M., Taleai, M., Motlagh, A., & Kamal, F. H. (2016). Developing a WebGIS for Geo-Visualization of Cancer. *Iranian journal of cancer prevention*, *9*(2).

GEOG 5201 Geovisualization – Autumn 2019
Syllabus

Meeting Times: MW 9:35am – 10:55pm, 135 Derby Hall

Instructor: Dr. Yang Song, song.630@osu.edu
- Office Hours and Location: By appointment. My office is 1120 Derby Hall.

Teaching Assistant: Zhihao Wang, wang.11424@osu.edu
- Office Hours and Location: TR 11:00am-12:00pm @ 1083 Derby Hall

Course Description: This is a theme-oriented course, which focuses on the examination of techniques, issues and applications of analytic cartography, interactive mapping and scientific visualization of geographic data.

Materials:
- Textbook:
  - No textbook is required for this course. All reading materials will be provided via the course website.
- Portable Memory Device:
  - A portable memory device (with 16GB or larger storage), such as a portable hard drive or flash drive, is required. Please bring it with you to every lab session as all your work needs to be saved to this device.
  - You can also store your data with a cloud drive (Box, Google Drive etc.). Please remember to log out the cloud drive when you finish using a lab PC.

Evaluation:
- Labs – 50%
  - There will be 12 labs, each with an assignment. All lab assignments will count toward your final grade of the course.
  - Lab assignments are usually due ***one week after the lab session (5:00pm of the due day)***. Lab 12 will be given extra two days to finish. Please refer to the course schedule for detailed information.
  - All lab assignments will be submitted via the course website in a quiz-like format. For each assignment, you need to answer several questions and may be asked to upload your work and/or data. Assignment questions will be provided to you in advance at the end of each lab's instruction.
  - Do not expect to finish all lab work during the scheduled lab time. You will need to work outside of class to complete your labs.
- Exams – 30%
  - There will be two non-cumulative exams. Both will be administered using the course website. Exams will be online using Carmen but will occur during normal class times using the computers in our normal classroom.
  - Exams will not be returned to you. If you want to review exams, please schedule a meeting with the instructor.
- Participation – 20%
  - Discussion Sessions – 10 points
    - There will be 4 discussion sessions of recent papers focusing on the themes of 3D, LiDAR, Time, and Web.

        - You are required to attend all of them but will only lead the group discussion for one of them.
        - After each discussion session, you will need to submit a focused critical analysis of the geovisualization method covered by the readings of the theme via the course website. This is always due ***the next day (5:00pm) of the discussion.***
    - Attendance – 10 points
        - Attendance is required and will be recorded at all class meetings (lectures and labs). An attendance sheet will be passed around the classroom, and you are responsible for remembering to sign it. If you forget to sign the attendance sheet during the scheduled class time, you will be marked absent (unexcused).
        - Unexcused Absences:
            - You may miss 2 class meetings (include lectures and labs) without penalty. Additional unexcused absences will result in a 1-point deduction from your attendance grade. No more than 10 points can be deducted from attendance.
        - Excused Absences:
            - Please email the instructor or TA for excused absences (e.g. due to illness, car trouble, conference attendance, required job training, passing away of a loved one, etc.) Proper documentation (e.g. doctor's note, bill from a mechanic, proof of conference registration, email from a supervisor, obituary, etc.) must be provided.
- Grading Scale (OSU standard scale):

A	93-100%	B-	80-82%	D+	67-69%
A-	90-92%	C+	77-79%	D	60-66%
B+	87-89%	C	73-76%	E	0-59%
B	83-86%	C-	70-72%		

    - Your final grade as seen on the course website will be rounded to the nearest whole number (e.g. an 89.49 is a B+ while an 89.50 is an A) before being submitted to the University Registrar at the end of the semester.

Course Policies:

- Email correspondence policy
    - You are responsible for all course related emails, so be sure to check your inbox on a daily basis.
    - When emailing your instructor, TA or grader, please always begin the subject of the email with the course number (GEOG5201) and your name (first name followed by last name). This is important as your instructor and TA teach multiple classes and need to know to which class you are referring. A proper email subject should be like this:

        GEOG5201_John Smith_Questions on Lab 3
- Course website policy
    - You are responsible for all announcements, additional readings, assignments and other material posted on the course website. Be sure to check it frequently.
- Lab questions policy
    - If you have any questions on lab content (can't finish specific steps, tools are not working etc.), please meet your TA during his office hours or via email.

    - Please send your lab-related questions as least 24 hours before the day/time the lab is due to allow your TA time to respond.
- Late submission policy
    - Focused critical analysis will not be accepted late.
    - Lab assignments will be penalized 10% for each day late.
    - Extensions will not be granted due to lost work. Be sure you back up and keep all your work.
- Exam policy
    - Exams must be taken at the scheduled time, unless you have informed your instructor ***before*** the exam with proper reasons and documents and got approved by the instructor. Please contact your instructor in advance of the scheduled exam to schedule a make-up exam, except in the case of emergency.
    - You are expected to arrive to all exams on time. Students who arrive late to the exam will be permitted to begin the exam, until the first student leaves. After a student completes the exam and leaves, students who arrive late will not be permitted to begin the exam, will be asked to leave, and will be considered absent. Your absence will be considered unexcused, except in the case of emergency.
    - You are expected to finish all exams on time. Exams begin when schedule class time begins, and exams end when the scheduled class time ends. At the end of the scheduled class time, you are to stop working and turn in your exam. You may not continue working on your exam after the scheduled class time.
- Disability services policy
    - Students with disabilities that have been certified by the Office for Disability Services (SLDS) will be appropriately accommodated and should inform the instructor as soon as possible of their needs. The Office for Disability Services is located in 098 Baker Hall, 113 W. 12th Ave, Columbus, OH 43210; telephone 614-292-3307; http://slds.osu.edu/.
    - Registration with SLDS does not grant accommodations automatically. You need to bring the accommodation form provided by SLDS to the instructor to work out a plan for accommodations. Please contact the instructor as soon as you are registered with SLDS for attendance, assignment and/or exam accommodations.
- Academic Misconduct policy
    - It is the responsibility of the Committee on Academic Misconduct (COAM) to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term “academic misconduct” includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee (Faculty Rule 3335-5-487). For additional information, see the Code of Student Conduct: http://studentlife.osu.edu/pdfs/csc_12-31-07.pdf.
    - Collaboration for the purposes of troubleshooting is highly encouraged in this course, but everyone is expected to submit their own unique work. For example, asking a classmate how to resolve an unexpected error message is OK, but using another classmate’s work (e.g. screen captures, etc.) as your own is NOT ok, regardless of whether or not they provide consent for the use of their materials. (Note: There are many other acceptable/unacceptable actions than those exemplified here.) If you have any questions or concerns about acceptable/unacceptable actions, ask your instructor for clarification/permission.

- Do NOT leave any of your work saved on the lab computers, as this presents data security and academic integrity concerns.
- All open-ended responses to questions, prompts, etc. must be written entirely, nearly entirely, or at least in majority using your own words. Use credible sources, and cite all sources, including those only referenced, those indirectly paraphrased, and those directly quoted, being sure to use quotation marks to identify excerpts from these credible sources. This expectation to cite all of your sources also extends to the textbook, the lab instructions, lecture slides, other course materials, online resources, etc. Please contact Center for the Study and Teaching of Writing (CSTW, https://cstw.osu.edu/writing-center) or the instructor if you have difficulties organizing language for assignments.

Classrooms:
If you need to return to the computer lab outside of class time, please be aware that the building maybe locked at night, over weekends, and on holidays, so be sure to plan accordingly. When you do return to the computer lab outside of class time, there may be a class in session. Please attempt to avoid interrupting classes that are in session, and if there is a class in session, check the computer lab across the hall in Derby 140. It has the same software as Derby 135, and it is usually available.

If you would like to check the schedules for Derby 135 and 140, you can check the Room Matrix:
https://delegated.osu.edu/psp/csosuda_1/EMPLOYEE/CAMP/c/OSR_CUSTOM_MENU.OSR_ROOM_MATRIX.GBL

- Enter DB0135 for Derby 135 or DB0140 for Derby 140.
- Select the date under “Show Week of”.
- Click “Refresh Calendar”.

Software:
You are NOT required to download the software we will be using in the course onto your own computer. However, information on obtaining ArcGIS and QGIS are provided here.

- ArcGIS. You may request a 1-year student trial license from your TA. Just email your TA, and your TA will send you an activation code. You will then need to activate the code and download the software here: http://www.esri.com/software/landing_pages/arcgis/desktop-ed.
  - If you choose to go this route, there is a detailed document regarding the entire process of downloading and installing ArcGIS for Desktop and authorizing it using an authorization code available on the course website, entitled “ESRI_installation_tips.pdf”. If your installation-related questions are not answered by this document, you will need to contact ESRI Customer Support at 1 (888) 377-4575.
  - Please note that ArcGIS for Desktop is NOT certified or supported on the Mac operating system. However, if you have an Apple computer running Windows, you can install ArcGIS for Desktop using VMWare, BootCamp, or Parallels. To learn more, please visit this link: http://gis.harvard.edu/services/blog/installing-arcgis-desktop-mac.
- QGIS. This is free and open source and can be obtained by visiting https://www.qgis.org/en/site/. Unlike ArcGIS, QGIS can operate on the Mac operating system.

    - Please note that if you choose to install QGIS onto your personal machine, your instructor and TA are NOT responsible for answering your installation-related questions. You will need to troubleshoot such issues yourself.
- ArcGIS Online and ArcGIS Pro. Please refer to the documents on the course website for the instructions of them ("Getting Started with ArcGIS Online.pdf" and "Getting Started with ArcGIS Pro.pdf"). The link included in "Getting Started with ArcGIS Pro.pdf" for the installation file of ArcGIS Pro may have not worked anymore and please use this link to download instead.

GEOG 5201 Geovisualization – Autumn 2019

Schedule

Week	Date	Content	Reading*	Note
1	W 08/21	Course Overview Discussion Groups (sign up)	Lecture readings: Geovisualization	
2	M 08/26	Lecture: Geovisualization - Part 1		
	W 08/28	Lecture: Geovisualization - Part 2	Lecture readings: 3D	
3	M 09/02	Labor Day, no class		
	W 09/04	Lecture: Geovisualization - Part 3 3D - Part 1	Discussion group readings: 3D	
4	M 09/09	Lecture: 3D - Part 2 *Discussion Groups (3D)*		
	W 09/11	Lab 1: 3D - ArcScene (guided)		
5	M 09/16	Lab 2: 3D ArcScene (unguided)		
	W 09/18	Lab 3: 3D QGIS (guided & unguided)		Lab 1 Due
6	M 09/23	Lecture: LiDAR - Part 1	Discussion group readings: LiDAR	Lab 2 Due
	W 09/25	Lecture: LiDAR - Part 2 *Discussion Groups (LiDAR)*		Lab 3 Due
7	M 09/30	***Exam 1***		
	W 10/02	Lab 4: LiDAR (guided)	Lecture readings: Uncertainty	
8	M 10/07	Lecture: Uncertainty	Lecture readings: Animation	
	W 10/09	Lecture: Animation Lab 5: Animation (guided & unguided)	Lecture readings: Time	Lab 4 Due
9	M 10/14	Lecture: Time	Discussion group readings: Time	
	W 10/16	*Discussion Groups (Time)* Lab 6: Time (guided)		Lab 5 Due
10	M 10/21	Lab 7: Time (unguided)	Lecture readings: Web	
	W 10/23	Lecture: Web – Part 1	Discussion group readings: Web	Lab 6 Due
11	M 10/28	Lecture: Web – Part 2 *Discussion groups (Web)*		Lab 7 Due
	W 10/30	***Exam 2***		
12	M 11/04	Lab 8: Web 1 (guided & unguided)		
	W 11/06	Lab 9: Web 2 (guided & unguided)		
13	M 11/11	Veterans Day, no class		Lab 8 Due
	W 11/13	Lab 10 (guided & unguided)		Lab 9 Due
14	M 11/18	Lab 11 (guided)		
	W 11/20	Lab 12 (guided & unguided)		Lab 10 Due
15	M 11/25	Work for labs, no class		Lab 11 Due
	W 11/27	Thanksgiving Day, no class		
16	M 12/02	Work for labs, no class		Lab 12 Due

*The assigned readings prepare you for the next class meeting.

This course schedule provides a general plan for the course. Any changes will be announced by the instructor with as much advance notice as possible.

GEOG 5201 Geovisualization (Hybrid)
Syllabus

Instructor Information

- Dr. Yang Song, song.630@osu.edu
- Office Hours and Location: By appointment only. 1120 Derby Hall or Zoom.

Teaching Associates

- TA:
  Office Hours and Location:
- Grader:

Course Description

This is a topic-oriented course focusing on the examination of concepts, techniques, issues and applications of analytical cartography, interactive mapping, and scientific visualization of geographic data. Approximately half of the course will be lectures introducing concepts and theories of geovisualization. The rest of the course will provide hands-on experience on interactive mapping and visualization of geographic data with ArcGIS and other software.

This course is hybrid and there is no required log-in to Carmen at a scheduled Time. All course materials (slides, lecture videos, lab data and exam study guide etc.) will be published online via Carmen. There will be in-person lab sessions (for all guided labs) and lecture/lab office hours. As lab materials can also be found on course website and Zoom office hours are also available, you can participate in-person components voluntarily. Each online lecture (may include multiple videos) will take approximately 80 minutes to finish while time to finish a lab may be longer than regular lab session (80 minutes). Students are expected to watch lecture videos weekly and keep up with weekly deadlines for lab assignments, exams, and short essays. This is a 3-credit hour class. For each week, students should expect approximately 3 hours spent on lectures and on/off-site labs at 135/140 Derby Hall, and 6 hours of independent study such as material reading, lab assignments and preparation for the exam to earn a C grade.

Course Learning Outcomes

By the end of the semester, students should be able to:

- Describe following concepts: analytical cartography, spatialization, interactive visualization, scientific visualization and geovisualization. Identify goals, driving forces, cognitive aspects, and widely employed methods and techniques of geovisualization.
- Understand the motivation of the development of 3D geovisualization. Identify the gains of going from 2D to 3D. Think critically about 3D geovisualization, identify potential problems employing 3D visualization techniques.

- Memorize the full name of LiDAR and describe the purpose of this remote sensing technique. Describe the physical process, operational theory, components, and principles of LiDAR systems. Understand basic processing steps of LiDAR data.
- Understand the concept of uncertainty and its importance in visualizing geographic data. Describe and compare methods of mapping uncertainty with visual variables.
- Know how time geography was born and understand the concept of space-time. Describe the constrains of space-time and how to use space-time prism to address space-time. Explain why time geography has barely developed since born and how GIS helps the visualization of time.
- Describe the brief evolution of cartography, from general purpose maps to cartography to web and interactive mapping. Identify the context of the emerging of web mapping. Describe the gold of web mapping and explain the difference between traditional and web mapping. Compare and contrast visual elements employed in traditional and web mapping. Identify programming languages and data formats utilized in web mapping.

Materials

- Textbook and reading materials:
    - No textbook is required for this course. All reading materials (each one with a pdf file) will be provided via Carmen.
    - Each week's reading materials, including lecture and essay readings, are organized in a module in Carmen. All content in each module is required for reading.
- Data storage:
    - A portable memory device (with 16GB or larger storage), such as a portable hard drive or flash drive, is required.
    - You can also use cloud drives (Box, Dropbox etc.) for data storage if preferred.

Evaluation

- Labs – 50%
    - There will be 12 labs, each with an assignment. All lab assignments will count toward your final grade of the course.
    - Lab assignments are usually due ***one week after a lab is assigned (6:00pm of the due day)***. Some of them will be granted longer time to finish due to complexity or holidays. Please refer to the course schedule for detailed information.
    - All lab assignments will be submitted via the course website in a quiz-like format. For each assignment, you need to answer several questions and may be asked to upload your work and/or data. Assignment questions will be provided to you in advance at the end of each lab's instruction.
- Exams – 30%

    - There will be two non-cumulative exams. Both will be administered using the course website. More details (question format, exam time and length etc.) will be provided at least one week before each exam via Carmen.
    - Exams cannot be opened in Carmen once finished. If you want to review exams, please schedule a meeting with the instructor.
- Short Essays – 20%
    - There will be 4 short essay assignments focusing on the themes of 3D, LiDAR, Time, and Web. After reading papers related to each theme, you will need to submit an essay of the geovisualization method covered by the readings of the theme via the course website. Please refer to course schedule for more information on when to read papers of different themes and dues of essays.
- Grading Scale

A	93-100%	B-	80-82%	D+	67-69%
A-	90-92%	C+	77-79%	D	60-66%
B+	87-89%	C	73-76%	E	0-59%
B	83-86%	C-	70-72%		

    - Your final grade as seen on the course website will be rounded to the nearest whole number (e.g. an 89.49 is a B+ while an 89.50 is an A-) before being submitted to the University Registrar at the end of the semester.

Course Policies

- Email correspondence policy
    - You are responsible for all course related emails, so be sure to check your inbox on a daily basis.
    - When emailing your instructor, TA or grader, please always begin the subject of the email with the course number (GEOG5201) and your name (first name followed by last name). This is important as your instructor and TA teach multiple classes and need to know to which class you are referring. A proper email subject should be like this:

        GEOG5201_John Smith_Questions on Lab 3
- Course website policy
    - You are responsible for all announcements, additional readings, assignments and other material posted on the course website. Be sure to check it frequently.
    - You may find that it helps to update your notifications. You can do this by going to Account > Notifications. There are four notification options, and I suggest that you turn on “Notify me right away” or at least “Send daily summary” for everything until you figure out which notifications are most beneficial to you.
- Lab questions policy
    - If you have any questions on lab content (can’t finish specific steps, tools are not working etc.), please contact your TA during office hours or via email.
    - If you have concerns on lab grades, please contact your grader via email.

- Late submission policy
  - Short essays will not be accepted late.
  - Lab assignments will be penalized 10% for each day late.
  - Extensions will not be granted due to lost work; be sure you back up and keep all your work.
- Exam policy
  - Exams must be taken at the scheduled time (detailed information can be found in Carmen), unless you have informed your instructor ***before*** the exam with proper reasons and documents, and got approved by the instructor. Please contact your instructor in advance of the scheduled exam to schedule a make-up exam, except in the case of emergency.
- Disability services policy
  - Students with disabilities that have been certified by the Office for Disability Services (SLDS) will be appropriately accommodated and should inform the instructor as soon as possible of their needs.
    - Address: 098 Baker Hall, 113 W. 12th Ave, Columbus, OH 43210
    - Telephone: 614-292-3307
    - Website: http://slds.osu.edu/
  - Registration with SLDS does not grant accommodations automatically. You need to bring the accommodation form provided by SLDS to the instructor to work out a plan for accommodations. Please contact the instructor as soon as you are registered with SLDS for attendance, assignment and/or exam accommodations.
- Academic Misconduct policy
  - It is the responsibility of the Committee on Academic Misconduct (COAM) to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term "academic misconduct" includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee (Faculty Rule 3335-5-487). For additional information, see the Code of Student Conduct: http://studentlife.osu.edu/pdfs/csc_12-31-07.pdf.
  - Collaboration for the purposes of troubleshooting is highly encouraged in this course, but everyone is expected to submit their own unique work. For example, asking a classmate how to resolve an unexpected error message is OK, but using another classmate's work (e.g. screen captures, etc.) as your own is NOT ok, regardless of whether or not they provide consent for the use of their materials. (Note: There are many other acceptable/unacceptable actions than those exemplified here.) If you have any questions or concerns about acceptable/unacceptable actions, ask your instructor for clarification/permission.
  - Do NOT leave any of your work saved on the lab computers, as this presents data security and academic integrity concerns.
  - All open-ended responses to questions, prompts, etc. must be written entirely, nearly entirely, or at least in majority using your own words. Use

credible sources, and cite all sources, including those only referenced, those indirectly paraphrased, and those directly quoted, being sure to use quotation marks to identify excerpts from these credible sources. This expectation to cite all of your sources also extends to the textbook, the lab instructions, lecture slides, other course materials, online resources, etc. Please contact Center for the Study and Teaching of Writing (CSTW, https://cstw.osu.edu/writing-center) or the instructor if you have difficulties organizing language for assignments.

- Other Course Policy
    - Please refer to Student Academic Services for more academic services provided by OSU.
    - Other student services can be accessed here.

Classrooms

If you need to return to the computer lab off hour, please be aware that the building maybe locked at night, over weekends, and on holidays, so be sure to plan accordingly. When you do return to the computer lab outside of class time, there may be a class in session. Please attempt to avoid interrupting classes that are in session, and if there is a class in session, check the computer lab across the hall in Derby 140. It has the same software as Derby 135, and it is usually available.

If you would like to check the schedules for Derby 135 and 140, you can check the Room Matrix:
https://delegated.osu.edu/psp/csosuda_1/EMPLOYEE/CAMP/c/OSR_CUSTOM_MENU.OSR_ROOM_MATRIX.GBL

- Enter DB0135 for Derby 135 or DB0140 for Derby 140.
- Select the date under “Show Week of”.
- Click “Refresh Calendar”.

Software

You are NOT required to download the software we will be using in the course onto your own computer. However, information on obtaining ArcGIS and QGIS are provided here.

- ArcGIS. You may request a 1-year student trial license from your TA. Just email your TA, and your TA will send you an activation code. You will then need to activate the code and download the software here: http://www.esri.com/software/landing_pages/arcgis/desktop-ed.
    - If you choose to go this route, there is a detailed document regarding the entire process of downloading and installing ArcGIS for Desktop and authorizing it using an authorization code available on the course website, entitled ESRI_installation_tips.pdf. If your installation-related questions are not answered by this document, you will need to contact ESRI Customer Support at 1 (888) 377-4575.
    - Please note that ArcGIS for Desktop is NOT certified or supported on the Mac operating system. However, if you have an Apple computer running Windows, you can install ArcGIS for Desktop using VMWare, BootCamp,

or Parallels. To learn more, please visit this link: http://gis.harvard.edu/services/blog/installing-arcgis-desktop-mac.
    - System requirements of ArcGIS desktop can be found here. Privacy policies of Esri products can be found here.
- ArcGIS Online and ArcGIS Pro. Please refer to associated installation documents in Carmen for detail. There is no specific system requirement for ArcGIS Online and you can use it as long as you have a web browser. System requirements of ArcGIS Pro can be found here. Privacy policies of Esri products can be found here.
- QGIS. This is free and open source and can be obtained by visiting https://www.qgis.org/en/site/. Unlike ArcGIS, QGIS can operate on the Mac operating system.
    - Please note that if you choose to install QGIS onto your personal machine, your instructor and TA are NOT responsible for answering your installation-related questions. You will need to troubleshoot such issues yourself.
    - There is no official documents regarding system requirements of QGIS, but you can find useful discussion on this topic here. There are no official privacy policies from developers of QGIS.
- Microsoft Office 365
    - All Ohio State students are now eligible for free Microsoft Office 365 ProPlus through Microsoft's Student Advantage program. Each student can install Office on five PCs or Macs, five tablets (Windows, iPad® and Android™) and five phones.
    - Office 365 is installed within student's BuckeyeMail account. Full instructions for downloading and installation can be found here.
- Proctorio: A software to monitor online exams. More details can be found here.

Other Course Technology

Please contact OSU IT Service Desk for any help with password, university e-mail, Carmen, or any other technology issues, questions, or requests. Standard support hours are available at https://ocio.osu.edu/help/hours, and support for urgent issues is available 24x7.

- Phone: 614-688-HELP (4357)
- Email: 8help@osu.edu
- Self-Service and Chat support: http://ocio.osu.edu/selfservice

Basic technical skills necessary for this course

- Basic computer and web-browsing skills
- Navigating and utilizing Carmen

Schedule

Week	Content	Readings*	Note
1	Course Overview Discussion Groups (sign up)	Lecture readings: Geovisualization	
2	Lecture: Geovisualization - Part 1		
	Lecture: Geovisualization - Part 2	Lecture readings: 3D	
3	Labor Day, no class		
	Lecture: Geovisualization - Part 3 3D - Part 1	Essay readings: 3D	
4	Lecture: 3D - Part 2 Discussion Groups (3D)		
	Lab 1: 3D ArcScene (guided)		
5	Lab 2: 3D ArcScene (unguided)		
	Lab 3: 3D QGIS (guided & unguided)		Lab 1 Due
6	Lecture: LiDAR - Part 1	Essay readings: LiDAR	Lab 2 Due
	Lecture: LiDAR - Part 2 Discussion Groups (LiDAR)		Lab 3 Due
7	Exam 1		
	Lab 4: LiDAR (guided)	Lecture readings: Uncertainty	
8	Lecture: Uncertainty	Lecture readings: Animation	
	Lecture: Animation Lab 5: Animation (guided & unguided)	Lecture readings: Time	Lab 4 Due
9	Lecture: Time	Essay readings: Time	
	Discussion Groups (Time) Lab 6: Time (guided)		Lab 5 Due
10	Lab 7: Time (unguided)	Lecture readings: Web	
	Lecture: Web – Part 1	Essay readings: Web	Lab 6 Due
11	Lecture: Web – Part 2 Discussion groups (Web)		Lab 7 Due
	Exam 2		
12	Lab 8: Web 1 (guided & unguided)		
	Veterans Day, no class		
13	Lab 9: Web 2 (guided & unguided)		Lab 8 Due
	Lab 10 (guided & unguided)		
14	Lab 11 (guided)		Lab 9 Due
	Lab 12 (guided & unguided)		Lab 10 Due
15	Work on labs, no class		Lab 11 Due
			Lab 12 Due

*The assigned readings prepare you for the next class meeting.

This course schedule provides a general plan for the course. Any changes will be announced by the instructor with as much advance notice as possible.

Lecture Reading List

Geovisualization

1. Tobler, W. R. (1976). Analytical cartography. *The American Cartographer*, *3*(1), 21-31.
2. Franklin, W. R. (2000). Applications of analytical cartography. *Cartography and Geographic Information Science*, *27*(3), 225-238.
3. Friendly, M., & Denis, D. J. (2001). Milestones in the history of thematic cartography, statistical graphics, and data visualization. *URL http://www. datavis. ca/milestones*, *32*, 13.

3D

1. Shepherd, I. D. (2008). Travails in the third dimension: A critical evaluation of three-dimensional geographical visualization.

Uncertainty

1. MacEachren, A. M., Robinson, A., Hopper, S., Gardner, S., Murray, R., Gahegan, M., & Hetzler, E. (2005). Visualizing geospatial information uncertainty: What we know and what we need to know. *Cartography and Geographic Information Science*, *32*(3), 139-160.
2. Deitrick, S., & Edsall, R. (2008). Making uncertainty usable: Approaches for visualizing uncertainty information. *Geographic Visualization: Concepts, Tools and Applications*, 277-291.

Animation

1. Muehlenhaus, I. (2013). *Web cartography: map design for interactive and mobile devices*. CRC Press, 173-190.

Time

1. Hägerstraand, T. (1970). What about people in regional science?. *Papers in regional science*, *24*(1), 7-24.
2. Kwan, M. P. (2004). GIS methods in time-geographic research: Geocomputation and geovisualization of human activity patterns. *Geografiska Annaler: Series B, Human Geography*, *86*(4), 267-280.
3. Goodchild, M. F. (2013). Prospects for a space–time GIS: Space–time integration in geography and GIScience. *Annals of the Association of American Geographers*, *103*(5), 1072-1077.

Web

1. Muehlenhaus, I. (2013). *Web cartography: map design for interactive and mobile devices*. CRC Press, 1-59.
2. Muehlenhaus, I. (2013). *Web cartography: map design for interactive and mobile devices*. CRC Press, 197-230.

Essay Reading List

3D

1. Richards-Rissetto, H., Robertsson, J., von Schwerin, J., Agugiaro, G., Remondino, F., & Girardi, G. (2014). Geospatial Virtual Heritage: a gesture-based 3D GIS to engage the public with Ancient Maya Archaeology. *Archaeology in the Digital Era*, 118-130.
2. Kwan, M. P., & Kotsev, A. (2015). Gender differences in commute time and accessibility in S ofia, B ulgaria: a study using 3 D geovisualisation. *The Geographical Journal*, *181*(1), 83-96.
3. Kete, P. (2016). Physical 3D Map of the Planica Nordic Center, Slovenia: Cartographic Principles and Techniques Used with 3D Printing. *Cartographica: The International Journal for Geographic Information and Geovisualization*, *51*(1), 1-11.

LiDAR

1. Hoffmeister, D., Zellmann, S., Pastoors, A., Kehl, M., Cantalejo, P., Ramos, J., ... & Bareth, G. (2016). The investigation of the Ardales Cave, Spain–3D documentation, topographic analyses, and lighting simulations based on terrestrial laser scanning. *Archaeological Prospection*, *23*(2), 75-86.
2. Lee, H. S., Kim, I. H., & Kim, H. G. (2016). Application of Terrestrial 3D Laser Scanning to Monitor Changes of Beach Landforms. *Journal of Coastal Research*, (75), 173-177.
3. Yan, W. Y., Morsy, S., Shaker, A., & Tulloch, M. (2016). Automatic extraction of highway light poles and towers from mobile LiDAR data. *Optics & Laser Technology*, *77*, 162-168.

Time

1. Chen, X., & Clark, J. (2013). Interactive three-dimensional geovisualization of space–time access to food. *Applied Geography*, *43*, 81-86.
2. Lu, Y., & Fang, T. B. (2015). Examining personal air pollution exposure, intake, and health danger zone using time geography and 3D geovisualization. *ISPRS International Journal of Geo-Information*, *4*(1), 32-46.
3. Cheng, E., Meiss, K., Park, K., Gillis, J., Weber, D., Ahmad, S., & Calyam, P. (2016, October). Contextual geotracking service of incident markers in disaster search-and-rescue operations. In *2016 IEEE 15th International Symposium on Network Computing and Applications (NCA)* (pp. 22-26). IEEE.
4. Turdukulov, U., & Fazio, T. (2016, April). Exploring Kimberley Bushfires in Space and Time. In *CEUR Workshop Proceedings* (Vol. 1570, pp. 25-29).

Web

1. Resch, B., Wohlfahrt, R., & Wosniok, C. (2014). Web-based 4D visualization of marine geo-data using WebGL. *Cartography and Geographic Information Science*, *41*(3), 235-247.
2. Kim, H. W., Kim, D. S., Lee, Y. W., & Ahn, J. S. (2015). 3-D Geovisualization of satellite images on smart devices by the integration of spatial DBMS, RESTful API and WebGL. *Geocarto International*, *30*(4), 422-440.
3. Herman, L., Stachoň, Z., Stuchlík, R., Hladík, J., & Kubíček, P. (2016). TOUCH INTERACTION WITH 3D GEOGRAPHICAL VISUALIZATION ON WEB: SELECTED TECHNOLOGICAL AND USER ISSUES. *International Archives of the Photogrammetry, Remote Sensing & Spatial Information Sciences*, *42*.
4. Khoshabi, M., Taleai, M., Motlagh, A., & Kamal, F. H. (2016). Developing a WebGIS for Geo-Visualization of Cancer. *Iranian journal of cancer prevention*, *9*(2).

Arts and Sciences Distance Learning Course Component Technical Review Checklist

Course: Geog 5201
Instructor: Yang Song
Summary: Cartography and Map Design

Standard - Course Technology	Yes	Yes with Revisions	No	Feedback/ Recomm.
6.1 The tools used in the course support the learning objectives and competencies.	X			• Office 365 • Carmen • ArcGIS • QGIS • RemoteLab
6.2 Course tools promote learner engagement and active learning.	X			• CarmenZoom • CarmenWiki • Carmen Discussion Boards
6.3 Technologies required in the course are readily obtainable.	X			All tools are available via OSU site license free of charge.
6.4 The course technologies are current.	X			All are updated regularly.
6.5 Links are provided to privacy policies for all external tools required in the course.		X		Privacy policies for all 3rd party tools (ArcGIS) need to be included.
Standard - Learner Support				
7.1 The course instructions articulate or link to a clear description of the technical support offered and how to access it.	X			Links to 8HELP are provided
7.2 Course instructions articulate or link to the institution's accessibility policies and services.	X			a
7.3 Course instructions articulate or link to an explanation of how the institution's academic support services and resources can help learners succeed in the course and how learners can obtain them.		X		Include statement b
7.4 Course instructions articulate or link to an explanation of how the institution's student services and resources can help learners succeed and how learners can obtain them.		X		Include statement c
Standard – Accessibility and Usability				
8.1 Course navigation facilitates ease of use.	X			Recommend using the Carmen Distance Learning "Master Course" template developed by ODEE and available in the Canvas Commons to provide student-users with a consistent user experience in terms of navigation and access to course content.
8.2 Information is provided about the accessibility of all technologies required in the course.		X		Accessibility policies for all 3rd party tools need to be included.
8.3 The course provides alternative means of access to course materials in formats that meet the needs of diverse learners.	X			Instructions are provided to obtain materials in another format.
8.4 The course design facilitates readability	X			
8.5 Course multimedia facilitate ease of use.	X			All assignments and activities that use the Carmen LMS with embedded multimedia facilitates ease of use. All other multimedia resources facilitate ease of use by being available through a standard web browser

Reviewer Information

- Date reviewed: 7/13/20
- Reviewed by: Ian Anderson

Notes: Include dates with weekly breakdown.

[a]The following statement about disability services (recommended 16 point font): Students with disabilities (including mental health, chronic or temporary medical conditions) that have been certified by the Office of Student Life Disability Services will be appropriately accommodated and should inform the instructor as soon as possible of their needs. The Office of Student Life Disability Services is located in 098 Baker Hall, 113 W. 12th Avenue; telephone 614- 292-3307, slds@osu.edu; slds.osu.edu.

[b]Add to the syllabus this link with an overview and contact information for the student academic services offered on the OSU main campus. http://advising.osu.edu/welcome.shtml

[c]Add to the syllabus this link with an overview and contact information for student services offered on the OSU main campus. http://ssc.osu.edu. Also, consider including this link in the “Other Course Policies” section of the syllabus.

Arts and Sciences Distance Learning Course Component Technical Review Checklist

Course: Geog 5201
Instructor: Yang Song
Summary: Cartography and Map Design

Standard - Course Technology	Yes	Yes with Revisions	No	Feedback/ Recomm.
6.1 The tools used in the course support the learning objectives and competencies.	X			• Office 365 • Carmen • ArcGIS • QGIS • RemoteLab
6.2 Course tools promote learner engagement and active learning.	X			• CarmenZoom • CarmenWiki • Carmen Discussion Boards
6.3 Technologies required in the course are readily obtainable.	X			All tools are available via OSU site license free of charge.
6.4 The course technologies are current.	X			All are updated regularly.
6.5 Links are provided to privacy policies for all external tools required in the course.		X		Privacy policies for all 3rd party tools (ArcGIS) need to be included.
Standard - Learner Support				
7.1 The course instructions articulate or link to a clear description of the technical support offered and how to access it.	X			Links to 8HELP are provided
7.2 Course instructions articulate or link to the institution's accessibility policies and services.	X			a
7.3 Course instructions articulate or link to an explanation of how the institution's academic support services and resources can help learners succeed in the course and how learners can obtain them.		X		Include statement b
7.4 Course instructions articulate or link to an explanation of how the institution's student services and resources can help learners succeed and how learners can obtain them.		X		Include statement c
Standard – Accessibility and Usability				
8.1 Course navigation facilitates ease of use.	X			Recommend using the Carmen Distance Learning "Master Course" template developed by ODEE and available in the Canvas Commons to provide student-users with a consistent user experience in terms of navigation and access to course content.
8.2 Information is provided about the accessibility of all technologies required in the course.		X		Accessibility policies for all 3rd party tools need to be included.
8.3 The course provides alternative means of access to course materials in formats that meet the needs of diverse learners.	X			Instructions are provided to obtain materials in another format.
8.4 The course design facilitates readability	X			
8.5 Course multimedia facilitate ease of use.	X			All assignments and activities that use the Carmen LMS with embedded multimedia facilitates ease of use. All other multimedia resources facilitate ease of use by being available through a standard web browser

Reviewer Information

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